

FORM PTO-1390

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**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

ATTORNEY DOCKET NUMBER IN-12122	U.S. APPLICATION NO. (IF KNOWN SEE 37 RR 15) 10/088223	
INTERNATIONAL APPLICATION NO. PCT/EP 00/08640	INTERNATIONAL FILING DATE 05.09.00	PRIORITY DATE CLAIMED 17.09.99
PREPARATION OF FLEXIBLE SLABSTOCK FOAM POLYOLS		
Georg Heinrich GROSCH; Harald LARBIG; Reinhard LORENZ; Dieter JUNGE; and Kathrin HARRE.		

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.
 2. ☐ This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.
 3. ☐ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371 (b) and PCT Articles 22 and 39(1).
 4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date
 5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
 6. ☒ A translation of the International Application into English (35 U.S.C. 371(C)(2)).
 7. ☒ Amendment to the claims of the International Application under PCT Article 19 (35 U.S.C.371(c)(3))
 - a. ☒ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made
 8. ☒ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
 9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
 10. ☐ A translation of the annex to the International Preliminary Examination Report under PCT Article 36
- Items 11. to 16. below concern other document(s) or information included:**
11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
 12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included
 13. ☒ A FIRST preliminary amendment.
☐ A SECOND or SUBSEQUENT preliminary amendment.
 14. ☐ A substitute specification.
 15. ☐ A Change of power of attorney and/or address letter.
 16. ☒ Other items or information: Postcard

**A copy of the cover sheet from the PCT Published Application
Notification of the Recording of a Change (Form PCT/1B/306)**

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Lori D. Hass
LORI D. HASS

PATENT

(Docket No. 12122)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

GEORG HEINRICH GROSCH ET AL.

Serial No.: NEW

Filed: HERewith

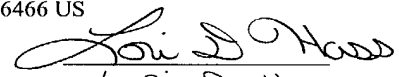
For: "PREPARATION OF FLEXIBLE
SLABSTOCK FOAM POLYOLS"

Group Art Unit: NEW

Examiner: NEW

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LORI D. HASS

PRELIMINARY AMENDMENT

BOX PCT APPLICATIONS

Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

In reference to the above-referenced patent application, please enter the following amendment and consider the accompanying remarks prior to examination thereof on the merits.

IN THE CLAIMS:

Please amend the claims as follows:

1. (amended) A polyether alcohol prepared by ring-opening polymerization of ethylene oxide and at least one alkylene oxide having at least three carbon atoms in the molecule onto H-functional initiator substances, wherein ethylene oxide or a mixture of ethylene oxide and at least one alkylene oxide having at least three carbon atoms in the molecule, where the mixture has an

8. (amended) A polyether alcohol as claimed in claim 4, wherein at least one basic compound is used as catalyst for the addition of the ethylene oxide or of the mixture of ethylene oxide and at least one alkylene oxide having at least 3 carbon atoms in the molecule, where the mixture has an ethylene oxide content of at least 98% by weight, based on the mixture, onto the initiator substance and at least one multimetal cyanide compound is used as catalyst for adding on the alkylene oxide or oxides having at least 3 carbon atoms in the molecule or the mixture of ethylene oxide and at least one alkylene oxide having at least 3 carbon atoms in the molecule, where the mixture has a maximum ethylene oxide content of 20% by weight, based on the mixture, and at least one basic compound is used as catalyst for adding on the ethylene oxide at the end of the chain.

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Appendix A

1. (amended) A polyether alcohol [which can be] prepared by ring-opening polymerization of ethylene oxide and at least one alkylene oxide having at least three carbon atoms in the molecule onto H-functional initiator substances, wherein ethylene oxide or a mixture of ethylene oxide and at least one alkylene oxide having at least three carbon atoms in the molecule, where the mixture has an ethylene oxide content of at least 98% by weight, based on the mixture, is added, in each case in an amount of not more than 40% by weight, based on the weight of the polyether alcohol, onto the initiator substance and subsequently at least one alkylene oxide having at least three carbon atoms in the molecule or a mixture of ethylene oxide and at least one alkylene oxide having at least three carbon atoms in the molecule, where the mixture has a maximum ethylene oxide content of 20% by weight, based on the mixture, is added on, and at least one multimetal cyanide compound is used as a catalyst.

2. (amended) A polyether alcohol as claimed in claim 1, wherein the alkylene oxides having at least three carbon atoms in the molecule are propylene oxide, butylene oxide, isobutylene oxide or any mixtures of at least two of the alkylene oxides [mentioned are used as alkylene oxides having at least three carbon atoms in the molecule].

8. (amended) A [process for preparing] polyether alcohol[s] as claimed in claim 4, wherein at least one basic compound is used as catalyst for the addition of the ethylene oxide or of the mixture of ethylene oxide and at least one alkylene oxide having at least 3 carbon atoms in the molecule, where the mixture has an ethylene oxide content of at least 98% by weight, based on the mixture, onto the initiator substance and at least one multimetal cyanide compound is used as catalyst for adding on the alkylene oxide or oxides having at least 3 carbon atoms in the molecule or the mixture of ethylene oxide and at least one alkylene oxide having at least 3 carbon atoms in

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REMARKS

Applicants respectfully request examination of the present application as amended herein. Claims 1-9 are pending in this application, an amended sheet of claims having been filed in the PCT application, a copy of the amended sheet in English and German accompanies this filing of the national phase application. Upon entry of the above preliminary amendment, claims 1-10 remain pending in the application. Claims 1, 2, 8 and 9 have been amended. New claim 10 has been added.

A marked-up version of the amended claims is attached hereto in Appendix A. Should the Examiner have any questions, please contact the undersigned attorney.

Respectfully submitted,

Date:

3/15/02



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Preparation of flexible slabstock foam polyols

The present invention relates to a process for preparing
5 polyether alcohols, to the polyether alcohols prepared by this
process and to their use for producing polyurethanes.

Polyether alcohols are used in large quantities for producing
polyurethanes. They are usually prepared by catalytic addition of
10 lower alkylene oxides, in particular ethylene oxide and propylene
oxide, onto H-functional initiator substances. Catalysts used are
usually basic metal hydroxides or salts, with potassium hydroxide
having the greatest practical importance.

15 The alkylene oxides are usually added on as a block or as a
random mixture. In the blockwise molecular addition, only one
alkylene oxide at a time is added on, while in the random
molecular addition, a mixture of alkylene oxides is present in
the reaction mixture.

20

In the industry, ethylene oxide and propylene oxide are usually
used as alkylene oxides, since they are readily available and
inexpensive. The reactivity of ethylene oxide is higher than that
of propylene oxide, so that the molecular addition of ethylene
25 oxide proceeds at a higher reaction rate. To increase the
space-time yield in the preparation of polyether alcohols it
would be desirable for the proportion of ethylene oxide in the
polyether alcohol to be as high as possible. Provision of
polyether alcohols which are intended for use in flexible foams
30 with terminal ethylene oxide blocks is known and customary. The
associated increase in the number of primary hydroxyl groups in
the polyether alcohols results in an increase in their reactivity
in the reaction with polyisocyanates. However, the increase in
the ethylene oxide content of the polyether alcohol also results
35 in an increase in the hydrophilicity of the polyether alcohol,
which can lead, inter alia, to undesirable gel formation in the
polyether alcohols.

Furthermore, in the synthesis of polyether alcohols having long
40 chains, as are used for producing flexible polyurethane foams,
increasing chain growth is associated with secondary reactions
which lead to defects in the chain structure. These by-products
are referred to as unsaturated constituents and lead to a
deterioration in the properties of the resulting polyurethanes.
45 Many attempts have therefore been made in the past to prepare
polyether alcohols having a low content of unsaturated
constituents. In particular, the alkoxylation catalysts used have

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been altered in a targeted way in an attempt to achieve this. Thus, EP-A-268 922 proposes using cesium hydroxide. Although this enables the content of unsaturated constituents to be reduced, cesium hydroxide is expensive and disposing of it is
5 problematical.

Furthermore, the use of multimetal cyanide complexes, usually zinc hexacyanometalates, also known as DMC catalysts, for preparing polyether alcohols having low contents of unsaturated
10 constituents is also known. There is a large number of documents in which the preparation of such compounds is described. Thus, DD-A-203 735 and DD-A-203 734 describe the preparation of polyetherols using zinc hexacyanocobaltate.

15 The preparation of the zinc hexacyanometalates is also known. These catalysts are usually prepared by reacting solutions of metal salts such as zinc chloride with solutions of alkali metal or alkaline earth metal cyanometalates, e.g. potassium hexacyanocobaltate. A water-miscible, heteroatom-containing
20 component is generally added to the resulting suspension immediately after the precipitation step. This component can also be present initially in one or both starting solutions. This water-miscible, heteroatom-containing component can be, for example, an ether, polyether, alcohol, ketone or a mixture
25 thereof. Such processes are described, for example, in US 3,278,457, US 3,278,458, US 3,278,459, US 3,427,256, US 3,427,334, US 3,404,109.

Polyether alcohols used for producing flexible slabstock foams
30 generally have a complete propylene oxide inner block which can make up as much as 40% by weight of the total polyol bound directly to the initiator substance and on this propylene oxide inner block have mixed blocks of propylene oxide and ethylene oxide which make up at least 60% by weight of the total polyol
35 and contain at least 2% by weight of ethylene oxide. These polyols are generally prepared using basic catalysts. WO-A-97/27,236 describes the preparation of a flexible slabstock foam polyol in which at least one propylene oxide inner block is added on using multimetal cyanides as catalyst. However, this
40 process does not permit a further increase in the ethylene oxide content of the polyether alcohol without the abovementioned disadvantages.

We have found that this object is achieved by a polyether alcohol which can be prepared by ring-opening polymerization of ethylene oxide and alkylene oxides having at least 3 carbon atoms, which comprises an inner block of ethylene oxide or a mixture of

ethylene oxide and alkylene oxides having at least 3 carbon atoms, and attached to this a block comprising at least one alkylene oxide having at least 3 carbon atoms or a mixture of ethylene oxide and alkylene oxides having at least 3 carbon atoms, preferably propylene oxide, where the mixed blocks

The present invention accordingly provides polyether alcohols which can be prepared by ring-opening polymerization of ethylene oxide and propylene oxide onto H-functional initiator substances, wherein not more than 40% by weight, based on the weight of the polyether alcohol, of ethylene oxide or a mixture of ethylene oxide and alkylene oxides having at least 3 carbon atoms, where the mixture has an ethylene oxide content of at least 98% by weight, based on the mixture, is added onto the initiator substance and subsequently at least one alkylene oxide having at least 3 carbon atoms or a mixture of ethylene oxide and at least one alkylene oxide having at least 3 carbon atoms, where the mixture has a maximum ethylene oxide content of 20% by weight,

If a mixture of ethylene oxide and at least one alkylene oxide having at least 3 carbon atoms is added on, the content of ethylene oxide should be at least 0.5% by weight, based on the

As alkylene oxides having at least 3 carbon atoms in the molecule, preference is given to using propylene oxide, butylene oxide and isobutylene oxide and also any mixtures of at least two of the alkylene oxides mentioned, particularly preferably propylene oxide.

In a preferred embodiment of the present invention, ethylene oxide can be added onto the polyether alcohol at the end of the chain, i.e. after the molecular addition of the alkylene oxides having at least 3 carbon atoms or of the mixture of ethylene oxide and alkylene oxides having at least 3 carbon atoms. The

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desired, be present at the end of the chain can likewise be added on by means of DMC catalysts, but preferably by means of basic catalysts. This procedure has the advantage that the delay which frequently occurs at the start of the reaction when using
 5 multimetal cyanide catalysts is avoided. This is balanced by increased costs due to the additional purification step.

When using different catalysts, it may be necessary to purify the polyether alcohol to remove catalyst prior to changing the
 10 catalysts. Particularly when changing from basic catalysts to DMC catalysts, a thorough purification is usually carried out because traces of the basic catalyst, in particular the alkali metal hydroxides customarily used, can poison the DMC catalyst.

15 The invention further provides polyurethanes which can be produced by reacting polyisocyanates with compounds having at least two hydrogen atoms which are reactive toward isocyanate groups, wherein the polyether alcohols of the present invention are used as compounds having at least two hydrogen atoms which
 20 are reactive toward isocyanate groups. The polyether alcohols of the present invention are preferably used for producing flexible polyurethane foams, with the polyether alcohols without a terminal ethylene oxide block being used, in particular, for producing slabstock foams and hot-cure molded foams and the
 25 polyether alcohols having a terminal ethylene oxide block being used, in particular, for producing cold-cure molded foams.

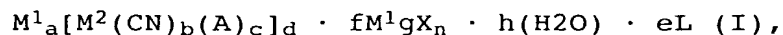
As initiator substances for preparing the polyetherols of the present invention, use is made of the customary polyfunctional
 30 alcohols having from 2 to 8 hydroxyl groups in the molecule. In particular, 2- and/or 3-functional alcohols, for example ethylene glycol, propylene glycol, glycerol or trimethylolpropane, are used for preparing polyether alcohols as are customarily used for producing flexible polyurethane foams.

35 The polyether alcohols of the present invention preferably have a molecular weight in the range from 1000 to 100,000.

Alkylenes used are, as indicated above, ethylene oxide and
 40 alkylenes having at least 3 carbon atoms, in the abovementioned ratios.

The multimetal cyanides used as catalysts in the process of the present invention usually have the formula (I)

45



where

M¹ is a metal ion selected from the group consisting of Zn²⁺, Fe²⁺, Co³⁺, Ni²⁺, Mn²⁺, Co²⁺, Sn²⁺, Pb²⁺, Mo⁴⁺, Mo⁶⁺, Al³⁺, V⁴⁺, V⁵⁺, Sr²⁺, W⁴⁺, W⁶⁺, Cr²⁺, Cr³⁺, Cd²⁺,

M² is a metal ion selected from the group consisting of Fe²⁺, Fe³⁺, Co²⁺, Co³⁺, Mn²⁺, Mn³⁺, V⁴⁺, V⁵⁺, Cr²⁺, Cr³⁺, Rh³⁺, Ru²⁺, Ir³⁺

10 and M^1 and M^2 are identical or different,

15 A is an anion selected from the group consisting of halide, hydroxide, sulfate, carbonate, cyanide, thiocyanate, isocyanate, cyanate, carboxylate, oxalate and nitrate,

X is an anion selected from the group consisting of halide, hydroxide, sulfate, carbonate, cyanide, thiocyanate, isocyanate, cyanate, carboxylate, oxalate and nitrate,

20 L is a water-miscible ligand selected from the group consisting of alcohols, aldehydes, ketones, ethers, polyethers, esters, ureas, amides, nitriles and sulfides,

25 and

a, b, c, d, g and n
are selected so that the compound is electrically neutral,
and

30 e is the coordination number of the ligand,

f is a fraction or integer greater than or equal to 0 and

35 h is a fraction or integer greater than or equal to 0.

These compounds are prepared by generally known methods by combining the aqueous solution of a water-soluble metal salt with the aqueous solution of a hexacyanometalate compound, in particular a salt or an acid, and adding a water-soluble ligand thereto during or after the mixing of the solutions.

Owing to their high activity, the multimetal cyanide compounds are very well suited to the synthesis of the polyether alcohols of the present invention. The catalyst concentrations used are less than 1% by weight, preferably less than 0.5% by weight, particularly preferably less than 1000 ppm, in particular less

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than 500 ppm, very particularly preferably less than 100 ppm, based on the total mass of the polyether polyol prepared. The preparation of the polyether alcohols by means of the multimetal cyanide compounds can be carried out either continuously or
5 batchwise. The synthesis can be carried out in suspension, in a fixed bed, in a moving bed or in a fluidized bed.

As far as the reaction conditions pressure and temperature are concerned, there is no difference in principle between catalysis
10 by means of basic compounds and by means of multimetal cyanide compounds. The molecular addition of the alkylene oxides is carried out at from 50°C to 200°C, preferably from 90°C to 150°C, and at pressures in the range from 0.001 bar to 100 bar, preferably from 0.001 bar to 20 bar for the molecular addition of
15 alkylene oxides having at least 3 carbon atoms in the molecule and preferably from 1 to 40 bar for the molecular addition of ethylene oxide. Before introducing the alkylene oxides, the reaction vessel is usually made inert by flushing with an inert gas, for example nitrogen.

20

The molecular addition of the alkylene oxides is usually followed by an after-reaction phase in order to effect complete reaction of the alkylene oxides.

25 After the reaction, the polyether alcohol formed is worked up in a customary fashion by firstly removing unreacted alkylene oxide and other volatile constituents from the crude polyether alcohol by stripping or distillation and, if necessary, removing suspended material and/or mechanical contamination by means of
30 filtration.

If the last process step was base-catalyzed, the catalyst has to be removed as usual from the polyether alcohol. For this purpose, the basic catalyst is usually neutralized with an acid and the
35 salts formed are removed from the polyether alcohol by means of filtration.

If the last process step has been catalyzed using multimetal cyanide compounds, the catalyst can in principle remain in the
40 polyether alcohol, but it can also be removed if necessary, for example by means of filtration.

The polyether alcohols of the present invention are very well suited to the production of polyurethanes, in particular flexible
45 polyurethane foams. They are very readily compatible with the other constituents of the polyurethane formulations and have, despite their comparatively high content of ethylene oxide units

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in the polyether chain, a low hydrophilicity. Owing to the higher reaction rate of the polymerization of ethylene oxide compared to propylene oxide, the space-time yield in the preparation of the polyether alcohols of the present invention is higher than that
5 in the case of conventional polyether alcohols for the same application areas. A further increase in the space-time yield can be achieved when at least part of the alkylene oxides is added on using multimetal cyanide compounds as catalyst.

10 The invention is illustrated by the following examples:

Examples 1 and 2

Addition of ethylene oxide onto an initiator substance

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Example 1

1115 g of glycerol and 32.5 g of a 47% strength aqueous potassium hydroxide solution were placed in a 10 l reactor. The water was
20 removed at 95-100°C under a reduced pressure of less than 1 mm of mercury over a period of 1.5 hours. At 110°C and a nitrogen prepressure of 3.5 bar abs., 3980 g of ethylene oxide were metered in over a period of 6 hours. After reaction was complete, a water pump vacuum was applied, 250 g of Ambosol® magnesium
25 silicate and 50 g of water were subsequently added to remove the catalyst and the polyether alcohol was subsequently filtered and dewatered by means of distillation.

The polyether alcohol formed had the following properties:

30 hydroxyl number: 394 mg KOH/g, viscosity at 25°C: 240 mPa*s, potassium content: 5 ppm.

Example 2

35 The procedure of Example 1 was repeated, but 612 g of glycerol, 31.7 g of a 47% strength aqueous potassium hydroxide solution and 4356 g of ethylene oxide were reacted.

The polyether alcohol formed had the following properties:

40 hydroxyl number: 219 mg KOH/g, viscosity at 25 °C: 222 mPa*s, potassium content: 3 ppm.

Examples 3 and 4

Preparation of the polyether alcohols

5 The syntheses were carried out in a 10 l stirred reactor. This was charged with the reaction products from Examples 1 and 2 at 50°C. The contents of the reactor were made inert by evacuating three times and each time filling with nitrogen. Degassing was carried out by evacuation at 105°C and a pressure of less than 10 1 mbar abs. for 1.5 hours. A double metal cyanide catalyst from the reaction of zinc acetate with hexacyanocobaltic acid and tert-butanol were then added. The reactor was again evacuated three times and each time filled with nitrogen. This was followed by evacuation to a pressure of less than 1 mbar abs. for about 15 half an hour with the temperature being increased to 125°C. At this temperature, a mixture of propylene oxide and ethylene oxide was added. After a further 30 minutes at 125°C, the polyether alcohol formed was freed of volatile constituents under reduced pressure. To remove the catalyst, the polyether alcohol was 20 filtered through a double layer of a Seitz deep filter (K 900).

The amounts of starting materials used and the properties of the polyether alcohols prepared are shown in Table 1.

25 Result:

All polyether alcohols have an inner block of glycerol and ethylene oxide. In Example 3, this is adjoined by a mixed block of ethylene oxide and propylene oxide, in Example 4 by a block of 30 propylene oxide.

Polyether alcohols which have only a small proportion of unsaturated constituents were obtained. Products having a very low hydroxyl number can also be obtained by the process of the 35 present invention. The polyether alcohols have narrow molecular weight distributions in all cases.

Table 1
Amounts of starting materials used and analyses of the polyether alcohols prepared

Exam- ple	Polyether from Example	Amount of polyether [g]	Catalyst [g]	Propyle- ne oxide [g]	Ethylene oxide [g]	Hydroxyl number [mgKOH/g]	Viscosity at 25 °C [mPa*s]	M _n [g]	M _w [g]	Unsaturated constituents [meq/g]
3	1	609.7	2.141	4288	107	47.1	722	2877	3093	0.0066
4	2	1097.3	2.142	3909	-	46.3	725	2849	3004	0.0058

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5	Rise height after 5 min	[mm]	270	260
	Air permeability	[mmWs]	10	10
	Foam density	[kg/m ³]	25.3	26.4
	Compressive strength at 40% compression	[kPa]	4.7	4.1
	Tensile strength	[kPa]	79,1	88
10	Elongation	[%]	121	146
	Compressive set at 50% compression	[%]	2.4	2.4

15 Polyol A: Glycerol-initiated polyether alcohol having an inner block of 30 parts by weight of propylene oxide and an adjoining mixed block of 57 parts by weight of propylene oxide and 10 parts by weight of ethylene oxide.

Table 3: Testing standards

20	Test method	Standard
	Foam density	DIN 53420
	Tensile test (tensile strength, elongation)	DIN 53571
25	Compressive set	DIN 53572
	Rebound resilience	DIN 53573
	Indentation hardness	DIN 53576
	Compressive strength	DIN 53577

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We claim:

1. A polyether alcohol which can be prepared by ring-opening
5 polymerization of ethylene oxide and at least one alkylene
oxide having at least three carbon atoms in the molecule onto
H-functional initiator substances, wherein ethylene oxide or
a mixture of ethylene oxide and at least one alkylene oxide
having at least three carbon atoms in the molecule, where the
10 mixture has an ethylene oxide content of at least 98% by
weight, based on the mixture, is added, in each case in an
amount of not more than 40% by weight, based on the weight of
the polyether alcohol, onto the initiator substance and
subsequently at least one alkylene oxide having at least
15 three carbon atoms in the molecule or a mixture of ethylene
oxide and at least one alkylene oxide having at least three
carbon atoms in the molecule, where the mixture has a maximum
ethylene oxide content of 20% by weight, based on the
mixture, is added on, and at least one multimetal cyanide
20 compound is used as catalyst.
2. A polyether alcohol as claimed in claim 1, wherein propylene
oxide, butylene oxide, isobutylene oxide or any mixtures of
at least two of the alkylene oxides mentioned are used as
25 alkylene oxides having at least three carbon atoms in the
molecule.
3. A polyether alcohol as claimed in claim 1, wherein propylene
oxide is used as alkylene oxide having at least three carbon
30 atoms in the molecule.
4. A polyether alcohol as claimed in claim 1, wherein ethylene
oxide is added on at the end of the chain.
- 35 5. A polyether alcohol as claimed in claim 4, wherein a maximum
of 15% by weight of ethylene oxide, based on the weight of
the polyether alcohol, is added on at the end of the chain.
6. A process for preparing polyether alcohols by ring-opening
40 polymerization of ethylene oxide and at least one alkylene
oxide having at least three carbon atoms in the molecule onto
H-functional initiator substances, which comprises adding
ethylene oxide or a mixture of ethylene oxide and at least
one alkylene oxide having at least three carbon atoms in the
45 molecule, where the mixture has an ethylene oxide content of
at least 98% by weight, based on the mixture, in each case in
an amount of not more than 40% by weight, based on the weight

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- of the polyether alcohol, onto the initiator substance and subsequently adding on at least one alkylene oxide having at least 3 carbon atoms in the molecule or a mixture of ethylene oxide and at least one alkylene oxide having at least 3
- 5 carbon atoms in the molecule, where the mixture has a maximum ethylene oxide content of 20% by weight, based on the mixture, and at least one multimetal cyanide compound is used as catalyst.
- 10 7. A process as claimed in claim 6, wherein at least one basic compound is used as catalyst for the addition of the ethylene oxide or of the mixture of ethylene oxide and at least one alkylene oxide having at least 3 carbon atoms in the
- 15 molecule, where the mixture has an ethylene oxide content of at least 98% by weight, based on the mixture, onto the initiator substance, and at least one multimetal cyanide compound is used as catalyst for adding on the alkylene oxide or oxides having at least 3 carbon atoms in the molecule or
- 20 the mixture of ethylene oxide and at least one alkylene oxide having at least 3 carbon atoms in the molecule, where the mixture has a maximum ethylene oxide content of 20% by weight, based on the mixture.
8. A process for preparing polyether alcohols as claimed in
- 25 claim 4, wherein at least one basic compound is used as catalyst for the addition of the ethylene oxide or of the mixture of ethylene oxide and at least one alkylene oxide having at least 3 carbon atoms in the molecule, where the mixture has an ethylene oxide content of at least 98% by
- 30 weight, based on the mixture, onto the initiator substance and at least one multimetal cyanide compound is used as catalyst for adding on the alkylene oxide or oxides having at least 3 carbon atoms in the molecule or the mixture of
- 35 ethylene oxide and at least one alkylene oxide having at least 3 carbon atoms in the molecule, where the mixture has a maximum ethylene oxide content of 20% by weight, based on the mixture, and at least one basic compound is used as catalyst for adding on the ethylene oxide at the end of the chain.
- 40 9. A polyurethane which can be produced by reacting polyisocyanates with compounds having at least two hydrogen atoms which are reactive toward isocyanate groups, wherein a polyether alcohol as claimed in any of claims 1 to 5 is used
- 45 as compound having at least two hydrogen atoms which are reactive toward isocyanate groups.

Preparation of flexible slabstock foam polyols

Abstract

5 Polyether alcohols can be prepared by ring-opening polymerization of ethylene oxide and at least one alkylene oxide having at least three carbon atoms in the molecule onto H-functional initiator substances, wherein ethylene oxide or a mixture of ethylene oxide
10 and at least one alkylene oxide having at least three carbon atoms in the molecule, where the mixture has an ethylene oxide content of at least 98% by weight, based on the mixture, is added, in each case in an amount of not more than 40% by weight, based on the weight of the polyether alcohol, onto the initiator
15 substance and subsequently at least one alkylene oxide having at least three carbon atoms in the molecule or a mixture of ethylene oxide and at least one alkylene oxide having at least three carbon atoms in the molecule, where the mixture has a maximum ethylene oxide content of 20% by weight, based on the mixture, is
20 added on.

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0050/050735

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

INVENTORSHIP IDENTIFICATION

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

PREPARATION OF FLEXIBLE SLABSTOCK FOAM POLYOLS

SPECIFICATION IDENTIFICATION

the specification of which

☐ is attached hereto.

☐ was filed on _____ as

Application Serial No. _____

and was amended on _____ (if applicable).

☒ was filed as PCT international application

Number PCT/EP00/08640

on September 5, 2000

and was amended under PCT Article 19

on _____ (if applicable)

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information known by me to be material to the patentability of this application in accordance with Title 37, Code of the Federal Regulations. §1.56(a).

☐ In compliance with this duty there is attached an information disclosure statement. 37 CFR 1.97.

☒ In compliance with this duty, information which may be material is disclosed in the specification of the subject application.

**CLAIM FOR BENEFIT OF EARLIER U. S. / PCT APPLICATION(S)
UNDER 35 U. S. C. 120**

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or PCT international application(s) designating the United States of America that is / are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that / those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national of PCT international filing date of this application.

U. S. Application(s) (or PCT applications designating U. S.)

U. S. Application Serial No.

Filing Date

**Status (pending, patented,
abandoned)**

RELATED FOREIGN APPLICATIONS

Related foreign applications, if any, filed in the name of the inventor(s) or the inventor(s) assigns more than twelve months before the filing of the subject application are as follows

Country

Application No.**Date of filing**

Date of issue or publication

POWER OF ATTORNEY

I hereby appoint the following attorney(s) and agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

David T. Banchik	Reg. No. <u>36,439</u> ;
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Karen M. Dellerman	Reg. No. <u>33,592</u> ;
James J. Drake	Reg. No. <u>34,584</u> ;
Mark A. Frentrup	Reg. No. <u>41,026</u> ;
George A. Gilbert	Reg. No. <u>35,881</u> ;
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each of the above attorney(s) and agent(s) to have full powers of substitution and revocation, and each and any attorney or agent so substituted to have full powers of substitution and revocation.

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CLAIM FOR BENEFIT OF FOREIGN PRIORITY UNDER 35 U. S. C. §119

Thereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

☐ No such applications have been filed.
☒ Such applications have been filed as follows

**DETAILS OF FOREIGN APPLICATION FROM WHICH PRIORITY CLAIMED
UNDER 35 U. S. C. §119**


Country	Application No.	Date of filing	Date of issue or publication
Germany	19944762.4	17 September 1999	

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

1 - 00

Georg Heinrich Grosch
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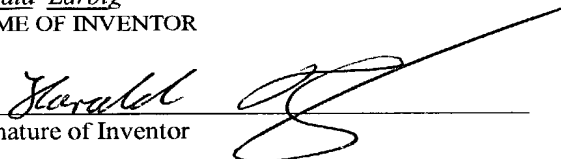

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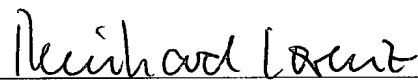

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